DOCUMENT RESUME

ED 334 398 CE 058 413

TITLE Standardized Curriculum for Plumber/Pipefitter/Steamfitter.
INSTITUTION Mississippi State Dept. of Education, Jackson. Office of Vocational, Technical and Adult Education.
PUB DATE Jun 89
NOTE 52p.; For related documents, see CE 058 387-419.
PUB TYPE Guides - Classroom Use - Teaching Guides (For Teacher) (052)

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS Behavioral Objectives; Check Lists; Competency Based Education; *Core Curriculum; Educational Resources; Hand Tools; *Plumbing; Secondary Education; State Curriculum Guides; *State Standards; Teaching Methods; Trade and Industrial Education; Vocational Education; *Welding
IDENTIFIERS Mississippi; *Pipe Fitters

ABSTRACT

This curriculum guide for plumbing/pipefitting/steamfitting was developed by the state of Mississippi to standardize vocational education course titles and core contents. The objectives contained in this document are common to all plumbing/pipefitting/steamfitting programs in the state. The guide contains objectives for Plumber/Pipefitter/Steamfitter I and II courses. Units in course I are as follows: occupational introduction and leadership activities; safety; tools and equipment; oxyacetylene cutting; oxyacetylene welding; shielded metal arc welding; pipe; and pipe fittings. Units in course II are as follows: orientation; safety; tools and equipment; oxyacetylene cutting; oxyacetylene welding; blueprint reading; measurements; valves and fittings; and plumbing fixtures. Each unit consists of these components: objectives, with core/essential objectives indicated; suggested instructional practices; list of suggested resources; list of evaluation and suggested minimum performance standards, with core/essential objectives indicated; and performance record, with core/essential objectives indicated. A checklist for each course combining all unit performance standards into a single list is included. (KC)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

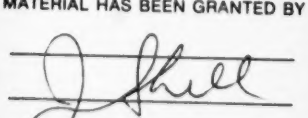
U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☑ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY



TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

STANDARDIZED CURRICULUM

FOR

PLUMBER/PIPEFITTER/STEAMFITTER

MISSISSIPPI DEPARTMENT OF EDUCATION

OFFICE OF VOCATIONAL, TECHNICAL

AND ADULT EDUCATION

June 1989

Direct inquiries to:

Thomas Piazza, Supervisor
Trade and Engineering Technology
Office of Vocational, Technical and Adult Education
P.O. Box 771
Jackson, Mississippi 39205
Phone: (601) 359-3937

Published by the:

Office of Vocational, Technical and Adult Education
Mississippi State Department of Education
Jackson, Mississippi

and

Research and Curriculum Unit for Vocational, Technical and Adult Education
College of Education
Mississippi State University
Mississippi State, Mississippi

1989

The State of Mississippi is an equal opportunity employer and does not discriminate or deny service on the basis of race, color, and national origin, sex, handicap, and/or age.

FOREWORD

This volume is intended to be used in the State of Mississippi as a mechanism for standardizing vocational education course titles and core contents. The need for standardization of curricula was triggered by provisions in the Educational Reform Act of 1982 which mandated:

-- elimination of nearly all currently existing curriculum requirements and development of new curriculum content that is "properly sequenced" and "coordinated";

-- steps to ensure that students master one level of course work before being advanced to the next level and that progression is properly sequenced;

-- a criterion-referenced, state-wide testing program that is built upon an identified set of "basic skills" keyed to student performance in grades 3, 5, 8, and 11;

-- revised graduation requirements that take into account student performance on the basic skills and also on a test of "functional literacy skills"; and

-- a system of accrediting schools that takes into account the performance of districts, schools, and students.

In addition to the mandates of the Educational Reform Act, the Strategic Plan for Vocational and Technical Education in Mississippi also calls for improving the quality of vocational and technical education through the standardization of curricula and the articulation of secondary and postsecondary programs.

Both of these mandates were further reinforced by legislation passed in 1986 which called for the establishment of state-wide "guidelines and procedures for managing an instructional program in the public schools." This legislation calls for instructional management plans containing the following components:

1. a written list of learning objectives for every course for which academic credit is given on students' transcripts (state specified core objectives must be included);

2. <u>suggested</u> instructional practices and resources for the learning objectives;

3. standards for student performance for each learning objective; and

4. systematic procedures for evaluating student performance on the learning objectives.

Specific local district actions regarding the state-wide instructional management plan are also required, namely:

1. The objectives contained in this document are common to all programs in the state. Core objectives are designated with an asterisk. The local district is encouraged to add additional objectives to this listing to meet local needs of students and employers.

2. The local school board must officially adopt the learning objectives as the district's curricula.

3. Pass/fail policies must be based on mastery of learning objectives.

4. Student performance on the learning objectives must be systematically evaluated at least once during the school year.

5. During the school year, records of individual student performance must indicate whether or not the objectives have been mastered. The record must indicate mastery status for each of the objectives tested in the Basic Skills Assessment Program (including functional literacy skills) and must be permanently maintained on all students who do <u>not</u> master the basic and functional literacy skills prior to being tested on them.

6. Each year, information about student performance on learning objectives must be reviewed. Those objectives which students are not mastering must be identified, and a plan must be developed for improving student performance on those objectives.

TABLE OF CONTENTS

Page

PLUMBER/PIPEFITTER/STEAMFITTER I..... 1

PLUMBER/PIPEFITTER/STEAMFITTER II..... 21

STUDENT PERFORMANCE RECORD..... 41

PLUMBER/PIPEFITTER/STEAMFITTER I

Developed by

Robert M. Evans, Hinds Community College--Rankin Branch
Robert Peterman, Pascagoula Vocational Center

PLUMBER/PIPEFITTER/STEAMFITTER I

Unit No.	Title
1	Occupational Introduction and Leadership Activities
2	Safety
3	Tools and Equipment
4	Oxyacetylene Cutting
5	Oxyacetylene Welding
6	Shielded Metal Arc Welding (SMAW)
7	Pipe
8	Pipe Fittings

COURSE: Plumber/Pipefitter/Steamfitter I

Unit 1: Occupational Introduction and Leadership Activities (5 days)

Objectives: Upon completion of this unit, the student will:

*1. Identify terms and definitions associated with the fundamentals of plumbing.
*2. Identify the duties of a plumber.
3. List jobs related to plumbing.
4. List reasons plumbers are needed.
5. Name the student organization related to Plumbing/Pipefitting/Steamfitter program.
6. List occupational fields related to plumbing.

*Indicates core/essential objectives

Suggested Instructional Practices:

Lecture, discussion, and practical application

Suggested Resources:

Primary Resource: Barclay, Leney. Residential Plumbing. Stillwater, Oklahoma: The Mid-America Vocational Curriculum Consortium, Inc. 1985.

Evaluation and Suggested Minimum Performance Standards:

*Objective 1: The student will identify seven terms and definitions associated with the fundamentals of plumbing.
*Objective 2: The student will identify three duties of a plumber.
Objective 3: The student will list three jobs related to plumbing.
Objective 4: The student will list two reasons plumbers are needed.
Objective 5: The student will name the student organization related to Plumbing/Pipefitting/Steamfitter program.
Objective 6: The student will list five occupational fields related to plumbing.

*Indicates core/essential objectives

Performance Record: Place a check by each objective the student achieved:

____*1. Identified terms and definitions associated with the fundamentals of plumbing.
____*2. Identified the duties of a plumber.
____ 3. Listed jobs related to plumbing.
____ 4. Listed reasons plumbers are needed.
____ 5. Named the student organization related to Plumbing/Pipefitting/Steamfitter program.
____ 6. Listed occupational fields related to plumbing.

*Indicates core/essential objectives

COURSE: Plumber/Pipefitter/Steamfitter I

Unit 2: Safety (10 days)

Objectives: Upon completion of this unit, the student will:

*1. Identify general safety rules related to plumbing.
*2. List personal safety rules.
*3. List shop safety rules.
*4. Demonstrate the proper technique in lifting heavy objects.

*Indicates core/essential objectives

Suggested Instructional Practices:

Lecture, discussion, and practical application

Suggested Resources:

Primary Resource: Barclay, Leney. Residential Plumbing. Stillwater, Oklahoma: The Mid-America Vocational Curriculum Consortium, Inc. 1985.

Evaluation and Suggested Minimum Performance Standards:

*Objective 1: The student will identify five general safety rules related to plumbing.
*Objective 2: The student will list seven personal safety rules.
*Objective 3: The student will list 14 shop safety rules.
*Objective 4: The student will demonstrate the proper techniques in lifting heavy objects.

*Indicates core/essential objectives

Performance Record: Place a check by each objective the student achieved:

___*1. Identified general safety rules related to plumbing.
___*2. Listed personal safety rules.
___*3. Listed shop safety rules.
___*4. Demonstrated the proper technique in lifting heavy objects.

*Indicates core/essential objectives

COURSE: Plumber/Pipefitter/Steamfitter I

Unit 3: Tools and Equipment (10 days)

Objectives: Upon completion of this unit, the student will:

*1. Identify terms and definitions associated with tools and equipment.
*2. Identify basic hand tools used in plumbing.
*3. List proper use and care of hand tools.
4. Identify power tools generally used in plumbing.
*5. List proper use and care of power tools.
*6. List safety precautions to be applied in the use of power tools used in plumbing.
*7. List equipment used in plumbing, pipefitting, and steamfitting.
*8. Use hand tools to cut a length of pipe.
*9. Identify rulers used for measuring.
*10. Read a rule/tape measure to the nearest eighth of an inch.
11. Measure and mark a predetermined length of pipe.
12. Use hand tools to ream a piece of steel pipe.
13. Use hand tools to cut pipe threads.

*Indicates core/essential objectives

Suggested Instructional Practices:

Lecture, discussion, and practical application

Suggested Resources:

Primary Resources: Barclay, Leney. Residential Plumbing. Stillwater, Oklahoma: The Mid-America Vocational Curriculum Consortium, Inc. 1985.

Introduction to Plumbing. Stillwater, Oklahoma: The Associated General Contractors of America. 1988.

Evaluation and Suggested Minimum Performance Standards:

*Objective 1: The student will identify 14 terms and definitions associated with tools and equipment.
*Objective 2: The student will identify 25 basic hand tools used in plumbing.
*Objective 3: The student will list five proper uses and care of hand tools.
Objective 4: The student will identify three power tools generally used in plumbing.

*Objective 5: The student will list proper use and care of power tools.
*Objective 6: The student will list seven safety precautions to be applied in the use of power tools used in plumbing.
*Objective 7: The student will list seven types of equipment used in plumbing, pipefitting, and steamfitting.
*Objective 8: The student will use hand tools to cut a length of pipe.
*Objective 9: The student will identify three rulers used for measuring.
*Objective 10: The student will read a rule/tape measure to the nearest eighth of an inch.
Objective 11: The student will measure and mark a predetermined length of pipe.
Objective 12: The student will use hand tools to ream a piece of steel pipe.
Objective 13: The student will use hand tools to cut pipe threads.

*Indicates core/essential objectives

Performance Record: Place a check by each objective the student achieved:

____ *1. Identified terms and definitions associated with tools and equipment.
____ *2. Identified basic hand tools used in plumbing.
____ *3. Listed proper use and care of hand tools.
____ 4. Identified power tools generally used in plumbing.
____ *5. Listed proper use and care of power tools.
____ *6. Listed safety precautions to be applied in the use of power tools used in plumbing.
____ *7. Listed equipment used in plumbing, pipefitting and steamfitting.
____ *8. Used hand tools to cut a length of pipe.
____ *9. Identified rulers used for measuring.
____ *10. Read a rule/tape measure to the nearest eighth of an inch.
____ 11. Measured and marked a predetermined length on a pipe.
____ 12. Used hand tools to ream a piece of steel pipe.
____ 13. Used hand tools to cut pipe threads.

*Indicates core/essential objectives

COURSE: Plumber/Pipefitter/Steamfitter I

Unit 4: Oxyacetylene Cutting (15 days)

Objectives: Upon completion of this unit, the student will:

1. Match terms related to oxyacetylene cutting with their correct definitions.
2. Identify parts of an oxyacetylene cutting torch.
3. List rules for tip use.
*4. List steps for properly starting a cut.
*5. List special safety requirements for oxyacetylene cutting.
6. Set up equipment for oxyacetylene cutting.
*7. Lay out a pattern on steel plate and cut pattern.
*8. Set up and cut a pipe level by hand.
9. Cut a hole in mild steel.

*Indicates core/essential objectives

Suggested Instructional Practices:

Lecture, discussion, and practical application

Suggested Resources:

Primary Resource: Fortney, Clarence and Gregory, Mike. Oxyacetylene Welding and Cutting. Stillwater, Oklahoma: Mid-America Vocational Curriculum Consortium, Inc. 1984.

Evaluation and Suggested Minimum Performance Standards:

Objective 1: The student will match two terms related to oxyacetylene cutting with their correct definitions.
Objective 2: The student will identify six parts of an oxyacetylene cutting torch.
Objective 3: The student will list two rules for tip use.
*Objective 4: The student will list three steps for properly starting a cut.
*Objective 5: The student will list five special safety requirements for oxyacetylene cutting.
Objective 6: The student will set up equipment for oxyacetylene cutting.
*Objective 7: The student will lay out a pattern on steel plate and cut pattern.
*Objective 8: The student will set up and cut a pipe level by hand.

*Objective 9: The student will cut a hole in mild steel.

*Indicates core/essential objectives

Performance Record: Place a check by each objective the student achieved:

____ 1. Matched terms related to oxyacetylene cutting with their correct definitions.
____ 2. Identified parts of an oxyacetylene cutting torch.
____ 3. Listed rules for tip use.
____ *4. Listed steps for properly starting a cut.
____ *5. Listed special safety requirements for oxyacetylene cutting.
____ 6. Set up equipment for oxyacetylene cutting.
____ *7. Laid out a pattern on steel plate and cut pattern.
____ *8. Set up and cut a pipe level by hand.
____ 9. Cut a hole in mild steel.

*Indicates core/essential objectives

COURSE: Plumber/Pipefitter/Steamfitter I

Unit 5: Oxyacetylene Welding (15 days)

Objectives: Upon completion of this unit, the student will:

*1. Match terms related to oxyacetylene welding with their correct definitions.
*2. List equipment required for oxyacetylene welding.
*3. List safety rules for the oxyacetylene work area.
*4. List safe clothing requirements.
*5. List basic safety rules for oxyacetylene cylinders and gases.
*6. Identify types of oxyacetylene flames.
*7. Light, adjust, and shut off an oxyacetylene welding torch in adherence with safety standards.
*8. List causes of backfire and flashback.
9. List welding positions.
10. Lay beads on a flat plate with no filler rod.
11. Lay beads on a flat plate with a filler rod.
12. Weld a butt joint in the flat position.

*Indicates core/essential objectives

Suggested Instructional Practices:

Lecture, discussion, and practical application

Suggested Resources:

Primary Resource: Fortney, Clarence and Gregory, Mike. Oxyacetylene Welding and Cutting. Stillwater, Oklahoma: Mid-America Vocational Curriculum Consortium, Inc. 1984.

Evaluation and Suggested Minimum Performance Standards:

*Objective 1: The student will match six terms related to oxyacetylene welding with their correct definitions.
*Objective 2: The student will list six pieces of equipment required for oxyacetylene welding.
*Objective 3: The student will list two safety rules for the oxyacetylene work area.
*Objective 4: The student will list three safe clothing requirements.
*Objective 5: The student will list seven basic safety rules for oxyacetylene cylinders and gases.
*Objective 6: The student will identify two types of oxyacetylene flames.

*Objective 7: Light, adjust and shut off and oxyacetylene welding torch in adherence with safety standards.
*Objective 8: The student will list five causes of backfire and flashback.
Objective 9: The student will list three welding positions.
Objective 10: The student will lay beads on a flat plate with no filler rod.
Objective 11: The student will lay beads on a flat plate with a filler rod.
Objective 12: The student will weld a butt joint in the flat position.

*Indicates core/essential objectives

Performance Record: Place a check by each objective the student achieved:

____*1. Matched terms related to oxyacetylene welding with their correct definitions.
____*2. Listed equipment required for oxyacetylene welding.
____*3. Listed safety rules for the oxyacetylene work area.
____*4. Listed safe clothing requirements.
____*5. Listed basic safety rules for oxyacetylene cylinders and gases.
____*6. Identified types of oxyacetylene flames.
____*7. Lit, adjusted, and shut off an oxyacetylene welding torch in adherence with safety standards.
____*8. Listed causes of backfire and flashback.
____ 9. Listed welding positions.
____10. Laid beads on a flat plate with no filler rod.
____11. Laid beads on a flat plate with a filler rod.
____12. Welded a butt point in the flat position.

*Indicates core/essential objectives

COURSE: Plumber/Pipefitter/Steamfitter I

Unit 6: Shielded Metal Arc Welding (SMAW) (30 days)

Objectives: Upon completion of this unit, the student will:

1. Match terms related to Shielded Metal Arc Welding with their correct definitions.
2. Select true statements concerning principles of Shielded Metal Arc Welding.
*3. List statements concerning electrical safety for arc welding.
*4. List statements concerning hazards associated with arc rays.
*5. List protective clothing required for arc welding.
6. List basic Shielded Metal Arc Welding accessories and their purposes.
7. List basic elements of arc welding and their importance.
*8. Strike an arc and lay a flat bead.
*9. Weld a butt joint in the flat position.
10. Demonstrate method of starting an arc.

*Indicates core/essential objectives

Suggested Instructional Practices:

Lecture, discussion, and practical application.

Suggested Resources:

Primary Resource: Fortney, Clarence and Gregory, Mike. Shielded Metal Arc Welding. Stillwater, Oklahoma: Mid-America Vocational Curriculum Consortium, Inc. 1984.

Evaluation and Suggested Minimum Performance Standards:

Objective 1: The student will match two terms related to Shielded Metal Arc Welding with their correct definitions.
Objective 2: The student will select two true statements concerning principles of Shielded Metal Arc Welding.
*Objective 3: The student will list seven statements concerning electrical safety for arc welding.
*Objective 4: The student will list two statements concerning hazards associated with arc rays.
*Objective 5: The student will list five types of protective clothing required for arc welding.
Objective 6: The student will list two basic Shielded Metal Arc Welding accessories and their purposes.

Objective 7: The student will list six basic elements of arc welding and their importance.
*Objective 8: The student will strike an arc and lay a flat bead.
*Objective 9: The student will weld a butt joint in the flat position.
Objective 10: The student will demonstrate two methods of starting an arc.

*Indicates core/essential objectives

Performance Record: Place a check by each objective the student achieved:

____ 1. Matched terms related to Shielded Metal Arc Welding with their correct definitions.
____ 2. Selected true statements concerning principles of Shielded Metal Arc Welding.
____*3. Listed statements concerning electrical safety for arc welding.
____*4. Listed statements concerning hazards associated with arc rays.
____*5. Listed protective clothing required for arc welding.
____ 6. Listed basic Shielded Metal Arc Welding accessories and their purposes.
____ 7. Listed basic elements of arc welding and their importance.
____*8. Struck an arc and laid a flat bead.
____*9. Welded a butt joint in the flat position.
____10. Demonstrated methods of starting an arc.

*Indicates core/essential objectives

COURSE: Plumber/Pipefitter/Steamfitter I

Unit 7: Pipe (25 days)

Objectives: Upon completion of this unit, the student will:

*1. Match terms related to pipe with their correct definitions.
*2. List types of pipes used in plumbing.
*3. Match types of copper pipe with the correct identification colors.
*4. Distinguish the difference between black and galvanized steel pipe.
*5. List advantages and disadvantages of P.V.C. pipe.
*6. List the three common methods of measuring pipe.
*7. Match terms related to joining pipe with their correct definitions.
*8. List tools, materials, and equipment necessary to join steel pipe.
*9. List tools, materials, and equipment necessary to join copper tubing by the sweat joint method.
*10. Select tools, materials, and equipment necessary to join copper tubing by the compression method.
*11. Select tools, materials, and equipment necessary to join copper tubing by the flare method.
*12. Cut, ream, thread, and join a piece of steel pipe to a steel fitting.
*13. Cut, ream, and join copper tubing using the sweat method.
*14. Cut, ream, and join copper tubing using a compression joint.
*15. Cut, ream, and join copper tubing using a flare joint.
*16. Thread steel pipe with adjustable die.
*17. Identify sizes of steel pipe.
*18. Cut, ream, and join PVC pipe to a PVC fitting.
*19. Define a gravity feed system.

*Indicates core/essential objectives

Suggested Instructional Practices:

Lecture, discussion, and practical application

Suggested Resources:

Primary Resource: Hohhertz, Durwin. General Construction Trades: Plumbing. Commerce, Texas: Occupational Curriculum Laboratory, East Texas State University. 1987.

Introduction to Plumbing. Stillwater, Oklahoma: The Associated General Contractors of America. 1988.

Evaluation and Suggested Minimum Performance Standards:

*Objective 1: The student will match four terms related to pipe with their correct definitions.
*Objective 2: The student will list four types of pipes used in plumbing.
*Objective 3: The student will match four types of copper pipe with the correct identification colors.
*Objective 4: The student will distinguish the difference between black and galvanized steel pipe.
*Objective 5: The student will list four advantages and disadvantages of P.V.C. pipe.
*Objective 6: The student will list the three common methods of measuring pipe.
*Objective 7: The student will match seven terms related to joining pipe with their correct definitions.
*Objective 8: The student will list six tools, materials, and equipment necessary to join steel pipe.
*Objective 9: The student will list eight tools, materials, and equipment necessary to join copper tubing by the sweat joint method.
*Objective 10: The student will select four tools, materials, and equipment necessary to join copper tubing by the compression method.
*Objective 11: The student will select six tools, materials, and equipment necessary to join copper tubing by the flare method.
*Objective 12: The student will cut, ream, thread, and join a piece of steel pipe to a steel fitting.
*Objective 13: The student will cut, ream, and join copper tubing using the sweat method.
*Objective 14: The student will cut, ream, and join copper tubing using a compression joint.
*Objective 15: The student will cut, ream, and join copper tubing using a flare joint.
*Objective 16: The student will thread steel pipe with adjustable die.
*Objective 17: The student will identify eight sizes of steel pipe.
*Objective 18: The student will cut, ream, and join PVC pipe to a PVC fitting.
*Objective 19: The student will define a gravity feed system.

*Indicates core/essential objectives

Performance Record: Place a check by each objective the student achieved:

____ *1. Matched terms related to pipe with their correct definitions.
____ *2. Listed types of pipes used in plumbing.
____ *3. Matched types of copper pipe with the correct identification colors.
____ *4. Distinguished the difference between black and galvanized steel pipe.
____ *5. Listed advantages and disadvantages of P.V.C. pipe.
____ *6. Listed the three common methods of measuring pipe.
____ *7. Matched terms related to joining pipe with their correct definitions.
____ *8. Listed tools, materials, and equipment necessary to join steel pipe.
____ *9. Listed tools, materials, and equipment necessary to join copper tubing by the sweat joint method.
____*10. Selected tools, materials, and equipment necessary to join copper tubing by the compression method.
____*11. Selected tools, materials, and equipment necessary to join copper tubing by the flare method.
____*12. Cut, reamed, threaded, and joined a piece of steel pipe to a steel fitting.
____*13. Cut, reamed, and joined copper tubing using the sweat method.
____*14. Cut, reamed, and joined copper tubing using a compression joint.
____*15. Cut, reamed, and joined copper tubing using a flare joint.
____*16. Threaded steel pipe with adjustable die.
____*17. Identified sizes of steel pipe.
____*18. Cut, reamed, and joined PVC pipe to a PVC fitting.
____*19. Defined a gravity feed system.

*Indicates core/essential objectives

COURSE: Plumber/Pipefitter/Steamfitter I

Unit 8: Pipe Fittings (25 days)

Objectives: Upon completion of this unit, the student will:

*1. Match terms related to pipe fittings with their correct definitions.
*2. Match the materials used to make plumbing fittings with specific uses, types, and properties.
*3. Identify basic plumbing branches.
*4. Identify basic plumbing bends.
*5. Identify basic union and couplings.
*6. Identify basic caps and plugs.
*7. Identify basic bushings and nipples.
*8. Identify basic closet flanges and clean-outs.
*9. Identify PVC-DWV fittings.
*10. Distinguish between the two types of malleable iron fittings.
*11. Identify two types of adapters.
*12. Read fitting size of a tee.
*13. Identify mechanical fittings.
*14. Repair a water line with a dresser coupling.
*15. Repair a water line using a hose and clamp (temporary).

*Indicates core/essential objectives

Suggested Instructional Practices:

Lecture, discussion, and practical application

Suggested Resources:

Primary Resources: Hohhertz, Durwin. General Construction Trades: Plumbing. Commerce, Texas: Occupational Curriculum Laboratory, East Texas State University. 1987.

Introduction to Plumbing. Stillwater, Oklahoma: The Associated General Contractors of America. 1988.

Evaluation and Suggested Minimum Performance Standards:

*Objective 1: The student will match ten terms related to pipe fittings with their correct definitions.

*Objective 2: The student will match four materials used to make plumbing fittings with specific uses, types, and properties.
*Objective 3: The student will identify eight basic plumbing branches.
*Objective 4: The student will identify four basic plumbing bends.
*Objective 5: The student will identify four basic union and couplings.
*Objective 6: The student will identify two basic caps and plugs.
*Objective 7: The student will identify two basic bushings and nipples.
*Objective 8: The student will identify two basic closet flanges and clean-outs.
*Objective 9: The student will identify 19 PVC-DWV fittings.
*Objective 10: The student will distinguish between the two types of malleable iron fittings.
*Objective 11: The student will identify two types of adapters.
*Objective 12: The student will read fitting size of a tee.
*Objective 13: The student will identify mechanical fittings.
*Objective 14: The student will repair a water line with a dresser coupling.
*Objective 15: The student will repair a water line using a hose and clamp (temporary).

*Indicates core/essential objectives

Performance Record: Place a check by each objective the student achieved:

____ *1. Matched terms related to pipe fittings with their correct definitions.
____ *2. Matched the materials used to make plumbing fittings with specific uses, types, and properties.
____ *3. Identified basic plumbing branches.
____ *4. Identified basic plumbing bends.
____ *5. Identified basic union and couplings.
____ *6. Identified basic caps and plugs.
____ *7. Identified basic bushings and nipples.
____ *8. Identified basic closet flanges and clean-outs.
____ *9. Identified PVC-DWV fittings.
____ *10. Distinguished between the two types of malleable iron fittings.
____ *11. Identified two types of adapters.
____ *12. Read fitting size of a tee.
____ *13. Identified mechanical fittings.

____*14. Repaired a water line with a dresser coupling.
____*15. Repaired a water line using a hose and clamp (temporary).

*Indicates core/essential objectives

PLUMBER/PIPEFITTER/STEAMFITTER II

Developed by

Robert M. Evans, Hinds Community College--Rankin Branch
Robert Peterman, Pascagoula Vocational Center

PLUMBER/PIPEFITTER/STEAMFITTER II

Unit No.	Title
1	Orientation
2	Safety
3	Tools and Equipment
4	Oxyacetylene Cutting
5	Oxyacetylene Welding
6	Blueprint Reading
7	Measurements
8	Valves and Fittings
9	Plumbing Fixtures

COURSE: Plumber/Pipefitter/Steamfitter II

Unit 1: Orientation (Review and Reinforce) (5 days)

Objectives: Upon completion of this unit, the student will:

1. Identify terms and definitions associated with the fundamentals of plumbing.
2. Identify the duties of a plumber.
3. List jobs related to plumbing.
4. List reasons plumbers are needed.
5. Name the student organization related to Plumber/Pipefitter/Steamfitter programs.

*Indicates core/essential objectives

Suggested Instructional Practices:

Lecture, discussion, and practical application

Suggested Resources:

Primary Resource: Barclay, Leney. Residential Plumbing. Stillwater, Oklahoma: The Mid-America Vocational Curriculum Consortium, Inc. 1985.

Evaluation and Suggested Minimum Performance Standards:

Objective 1: The student will identify seven terms and definitions associated with the fundamentals of plumbing.
Objective 2: The student will identify three duties of a plumber.
Objective 3: The student will list three jobs related to plumbing.
Objective 4: The student will list two reasons plumbers are needed.
Objective 5: The student will name the student organization related to Plumber/Pipefitter/Steamfitter programs.

*Indicates core/essential objectives

Performance Record: Place a check by each objective the student achieved:

____ 1. Identified terms and definitions associated with the fundamentals of plumbing.
____ 2. Identified the duties of a plumber.
____ 3. Listed jobs related to plumbing.
____ 4. Listed reasons plumbers are needed.
____ 5. Named the student organization related to Plumber/Pipefitter/Steamfitter programs.

*Indicates core/essential objectives

COURSE: Plumber/Pipefitter/Steamfitter II

Unit 2: Safety (Review and Reinforce) (10 days)

Objectives: Upon completion of this unit, the student will:

*1. Identify general safety rules related to plumbing.
*2. List personal safety rules.
*3. List shop safety rules.
*4. Demonstrate the proper method of lifting heavy objects.

*Indicates core/essential objectives

Suggested Instructional Practices:

Lecture, discussion, and practical application

Suggested Resources:

Primary Resource: Barclay, Leney. Residential Plumbing. Stillwater, Oklahoma: The Mid-America Vocational Curriculum Consortium, Inc. 1985.

Evaluation and Suggested Minimum Performance Standards:

*Objective 1: The student will identify five general safety rules related to plumbing.
*Objective 2: The student will list seven personal safety rules.
*Objective 3: The student will list 14 shop safety rules.
*Objective 4: The student will demonstrate the proper method of lifting heavy objects.

*Indicates core/essential objectives

Performance Record: Place a check by each objective the student achieved:

____*1. Identified general safety rules related to plumbing.
____*2. Listed personal safety rules.
____*3. Listed shop safety rules.
____*4. Demonstrated the proper method of lifting heavy objects.

*Indicates core/essential objectives

COURSE: Plumber/Pipefitter/Steamfitter II

Unit 3: Tools and Equipment (Review and Reinforce) (10 days)

Objectives: Upon completion of this unit, the student will:

*1. Identify terms and definitions associated with tools and equipment.
*2. Identify basic hand tools used in plumbing.
*3. List proper use and care of hand tools.
*4. Identify power tools generally used in plumbing.
*5. List proper use and care of power tools.
*6. List safety precautions to be applied in the use of power tools used in plumbing.
7. Identify pieces of equipment used in plumbing, pipefitting, and steamfitting.
*8. Use hand tools to cut a length of pipe.
*9. Identify rulers used for measuring.
*10. Read a rule/tape measure to the nearest eighth of an inch.
11. Demonstrate ability to use power tools.
12. Select the proper power tool for a job.
13. Demonstrate the ability to use a plumber's level.

*Indicates core/essential objectives

Suggested Instructional Practices:

Lecture, discussion, and practical application

Suggested Resources:

Primary Resources: Barclay, Leney. Residential Plumbing. Stillwater, Oklahoma: The Mid-America Vocational Curriculum Consortium, Inc. 1985.

Introduction to Plumbing. Stillwater, Oklahoma: The Associated General Contractors of America. 1988.

Evaluation and Suggested Minimum Performance Standards:

*Objective 1: The student will identify 14 terms and definitions associated with tools and equipment.
*Objective 2: The student will identify 25 basic hand tools used in plumbing.
*Objective 3: The student will list six proper uses and care of hand tools.

*Objective 4: The student will identify three power tools generally used in plumbing.
*Objective 5: The student will list two proper uses and care of power tools.
*Objective 6: The student will list seven safety precautions to be applied in the use of power tools used in plumbing.
Objective 7: The student will identify seven pieces of equipment used in plumbing, pipefitting, and steamfitting.
*Objective 8: The student will use hand tools to cut a length of pipe.
*Objective 9: The student will identify three rulers used for measuring.
*Objective 10: The student will read a rule/tape measure to the nearest eighth of an inch.
Objective 11: The student will demonstrate the ability to use three power tools.
Objective 12: The student will select the proper power tool for a job.
Objective 13: The student will demonstrate the ability to use a plumber's level.

*Indicates core/essential objectives

Performance Record: Place a check by each objective the student achieved:

____ *1. Identified terms and definitions associated with tools and equipment.
____ *2. Identified basic hand tools used in plumbing.
____ *3. Listed proper use and care of hand tools.
____ *4. Identified power tools generally used in plumbing.
____ *5. Listed proper use and care of hand tools.
____ *6. Listed safety precautions to be applied in the use of power tools used in plumbing.
____ 7. Listed equipment used in plumbing, pipefitting, and steamfitting.
____ *8. Used hand tools to cut a length of pipe.
____ *9. Identified rulers used for measuring.
____ *10. Read a rule/tape measure to the nearest eighth of an inch.
____ 11. Demonstrated ability to use power tools.
____ 12. Selected the proper power tool for a job.
____ 13. Demonstrated the ability to use a plumber's level.

*Indicates core/essential objectives

COURSE: Plumber/Pipefitter/Steamfitter II

Unit 4: Oxyacetylene Cutting (10 days)

Objectives: Upon completion of this unit, the student will:

1. Match terms related to oxyacetylene cutting with their correct definitions.
*2. Identify parts of an oxyacetylene cutting torch.
3. List rules for tip use.
4. List steps for properly starting a cut.
*5. List special safety requirements for oxyacetylene cutting.
*6. Set up equipment for oxyacetylene cutting.
*7. Lay out a pattern on steel plate and cut pattern.
*8. Set up and cut a pipe bevel by hand.
9. Cut a hole in mild steel.
10. Make a beveled cut on mild steel plate.
11. Make cuts on mild steel and restart a cut.

*Indicates core/essential objectives

Suggested Instructional Practices:

Lecture, discussion, and practical application

Suggested Resources:

Primary Resource: Fortney, Clarence and Gregory, Mike. Oxyacetylene Welding and Cutting. Stillwater, Oklahoma: Mid-America Vocational Curriculum Consortium, Inc. 1984.

Evaluation and Suggested Minimum Performance Standards:

Objective 1: The student will match two terms related to oxyacetylene cutting with their correct definitions.
*Objective 2: The student will identify six parts of an oxyacetylene cutting torch.
Objective 3: The student will list two rules for tip use.
Objective 4: The student will list three steps for properly starting a cut.
*Objective 5: The student will list five special safety requirements for oxyacetylene cutting.
*Objective 6: The student will set up equipment for oxyacetylene cutting.
*Objective 7: The student will lay out a pattern on steel plate and cut pattern.

*Objective 8: The student will set up and cut a pipe bevel by hand.
Objective 9: The student will cut a hole in mild steel.
Objective 10: The student will make a beveled cut on mild steel plate.
Objective 11: The student will make cuts on mild steel on mild steel and restart a cut.

*Indicates core/essential objectives

Performance Record: Place a check by each objective the student achieved:

____ 1. Matched terms related to oxyacetylene cutting with their correct definitions.
____ *2. Identified parts of an oxyacetylene cutting torch.
____ 3. Listed rules for tip use.
____ 4. Listed steps for properly starting a cut.
____ *5. Listed special safety requirements for oxyacetylene cutting.
____ *6. Set up equipment for oxyacetylene cutting.
____ *7. Laid out a pattern on steel plate and cut pattern.
____ *8. Set up and cut a pipe bevel by hand.
____ 9. Cut a hole in mild steel.
____ 10. Make a beveled cut on mild steel plate.
____ 11. Made cuts on mild steel and restarted a cut.

*Indicates core/essential objectives

COURSE: Plumber/Pipefitter/Steamfitter II

Unit 5: Oxyacetylene Welding (10 days)

Objectives: Upon completion of this unit, the student will:

*1. Match terms related to oxyacetylene welding with their correct definitions.
*2. List equipment required for oxyacetylene welding.
*3. List safety rules for oxyacetylene cylinders and gases.
*4. List safe clothing requirements.
*5. List basic safety rules for oxyacetylene cylinders and gases.
*6. Identify types of oxyacetylene flames.
*7. List causes of backfire and flashback.
*8. Light, adjust, and shut off an oxyacetylene welding torch in adherence with safety standards.
*9. Lay beads on a flat plate with no filler rod.
*10. Lay beads on a flat plate with a filler rod.
11. Weld a butt joint in the flat position.
12. Sweat a copper fitting to a piece of copper tubing.

*Indicates core/essential objectives

Suggested Instructional Practices:

Lecture, discussion, and practical application

Suggested Resources:

Primary Resource: Fortney, Clarence and Gregory, Mike. Oxyacetylene Welding and Cutting. Stillwater, Oklahoma: Mid-America Vocational Curriculum Consortium, Inc. 1984.

Evaluation and Suggested Minimum Performance Standards:

*Objective 1: The student will match five terms related to oxyacetylene welding with their correct definitions.
*Objective 2: The student will list six pieces of equipment required for oxyacetylene welding.
*Objective 3: The student will list two safety rules for oxyacetylene cylinders and gases.
*Objective 4: The student will list three safe clothing requirements.
*Objective 5: The student will list seven basic safety rules for oxyacetylene cylinders and gases.
*Objective 6: The student will identify two types of oxyacetylene flames.

*Objective 7: The student will list five causes of backfire and flashback.

*Objective 8: The student will light, adjust, and shut off an oxyacetylene welding torch in adherence with safety standards.

*Objective 9: The student will lay beads on a flat plate with no filler rod.

*Objective 10: The student will lay beads on a flat plate with a filler rod.

Objective 11: The student will weld a butt joint in the flat position.

Objective 12: The student will sweat a copper fitting to a piece of copper tubing.

*Indicates core/essential objectives

Performance Record: Place a check by each objective the student achieved:

____ *1. Matched terms related to oxyacetylene welding with their correct definitions.
____ *2. Listed equipment required for oxyacetylene welding.
____ *3. Listed safety rules for oxyacetylene cylinders and gases.
____ *4. Listed safe clothing requirements.
____ *5. Listed basic safety rules for oxyacetylene cylinders and gases.
____ *6. Identified types of oxyacetylene flames.
____ *7. Listed causes of backfire and flashback.
____ *8. Lit, adjusted, and shut off an oxyacetylene welding torch in adherence with safety standards.
____ *9. Laid beads on a flat plate with no filler rod.
____ *10. Laid beads on a flat plate with a filler rod.
____ 11. Welded a butt joint in the flat position.
____ 12. Sweated a copper fitting to a piece of copper tubing.

*Indicates core/essential objectives

COURSE: Plumber/Pipefitter/Steamfitter II

Unit 6: Blueprint Reading (30 days)

Objectives: Upon completion of this unit, the student will:

*1. Match terms related to blueprint reading with the correct definitions.
*2. List types of architectural drawings.
*3. Identify plumbing and appliance symbols.
*4. Identify piping symbols for plumbing.
*5. Identify piping symbols for heating.
*6. Identify fittings and valve symbols.
*7. Draw a four sided drawing to scale and specifications.
*8. List items that are included in a set of specifications.
*9. Match terms related to building and plumbing codes with the correct definitions.
*10. Identify benefits of zoning laws.
*11. Identify benefits of building codes.
*12. Identify benefits of plumbing codes.
*13. Identify illegal fittings and installation.
*14. Identify procedures to be followed, dealing with water, sewer, and gas main connections.

*Indicates core/essential objectives

Suggested Instructional Practices:

Lecture, discussion, and practical application

Suggested Resources:

Primary Resource: Fortney, Clarence and Gregory, Mike. Shielded Metal Arc Welding. Stillwater, Oklahoma: Mid-America Vocational Curriculum Consortium, Inc. 1984.

Evaluation and Suggested Minimum Performance Standards:

*Objective 1: The student will match seven terms related to blueprint reading with the correct definitions.
*Objective 2: The student will list four types of architectural drawings.
*Objective 3: The student will identify nine plumbing and appliance symbols.
*Objective 4: The student will identify four piping symbols for plumbing.

*Objective 5: The student will identify three piping symbols for heating.
*Objective 6: The student will identify three fittings and valve symbols.
*Objective 7: The student will draw a four sided drawing to scale and specifications.
*Objective 8: The student will list five items that are included in a set of specifications.
*Objective 9: The student will match six terms related to building and plumbing codes with the correct definitions.
*Objective 10: The student will identify two benefits of zoning laws.
*Objective 11: The student will identify benefits of building codes.
*Objective 12: The student will identify two benefits of plumbing codes.
*Objective 13: The student will identify two illegal fittings and installation.
*Objective 14: The student will identify procedures to be followed, dealing with water, sewer, and gas main connections.

*Indicates core/essential objectives

Performance Record: Place a check by each objective the student achieved:

____ *1. Matched terms related to blueprint reading with the correct definitions.
____ *2. Listed types of architectural drawings.
____ *3. Identified plumbing and appliance symbols.
____ *4. Identified piping symbols for plumbing.
____ *5. Identified piping symbols for heating.
____ *6. Identified fittings and valve symbols.
____ *7. Drew a four sided drawing to scale and specification.
____ *8. Listed items that are included in a set of specifications.
____ *9. Matched terms related to building and plumbing codes with the correct definitions.
____*10. Identified benefits of zoning laws.
____*11. Identified benefits of building codes.
____*12. Identified benefits of plumbing codes.
____*13. Identified illegal fittings and installations.
____*14. Identified procedures to be followed, dealing with water, sewer, and gas main connections.

*Indicates core/essential objectives

COURSE: Plumber/Pipefitter/Steamfitter II

Unit 7: Measurements (20 days)

Objectives: Upon completion of this unit, the student will:

*1. Measure a pipe to the nearest 1/16 inch.
*2. Add and subtract fractions and whole numbers.
*3. Compute pipe offsets using trigonometric constants.
*4. Convert feet to inches.
*5. Convert inches to feet.
*6. Convert fractions to decimals.
*7. Change decimal to a usable form.
*8. Identify parts of a builder's level (transit).
*9. Determine the rate of fall between two given points, using the builder's level.

*Indicates core/essential objectives

Suggested Instructional Practices:

Lecture, discussion, and practical application

Suggested Resources:

Primary Resources: Barclay, Leney. Residential Plumbing. Stillwater, Oklahoma: The Mid-America Vocational Curriculum Consortium, Inc. 1985

Blankenbaker, Keith E. Modern Plumbing. South Holland, Illinois: The Goodheart-Willcox Co., Inc. 1987.

Slater, Harry and Smith, Lee. Basic Plumbing. Delmar Publishers, Inc. 1979.

Frankland, Thomas W. The Pipe Fitter's and Pipe Welder's Handbook. Mission Hills, California: Glencoe Publishing Co. (no date).

Evaluation and Suggested Minimum Performance Standards:

*Objective 1: The student will measure a pipe to the nearest 1/16 inch.
*Objective 2: The student will add and subtract fractions and whole numbers.

*Objective 3: The student will compute pipe offsets using trigonometric constants.
*Objective 4: The student will convert feet to inches.
*Objective 5: The student will convert inches to feet.
*Objective 6: The student will convert fractions to decimals.
*Objective 7: The student will change decimal to a usable form.
*Objective 8: The student will identify five parts of a builder's level (transit).
*Objective 9: The student will determine the rate of fall between two given points, using the builder's level.

*Indicates core/essential objectives

Performance Record: Place a check by each objective that the student achieved:

____ *1. Measured a pipe to the nearest 1/16 inch.
____ *2. Added and subtracted fractions and whole numbers.
____ *3. Computed pipe offsets using trigonometric constants.
____ *4. Converted feet to inches.
____ *5. Converted inches to feet.
____ *6. Converted fractions to decimals.
____ *7. Changed decimal to a usable form.
____ *8. Identified parts of a builder's level (transit).
____ *9. Determined, the rate of fall between two given points, using the builder's level.

*Indicates core/essential objectives

COURSE: Plumber/Pipefitter/Steamfitter II

Unit 8: Valves and Fittings (25 days)

Objectives: Upon completion of this unit, the student will:

*1. Match terms related to water valves and faucets with their correct definitions.
*2. Identify three types of valves.
*3. Identify types of faucets.
4. List features which best describe specific faucets.
*5. List types of copper tubing fittings (sweat, flare, compression).

*Indicates core/essential objectives

Suggested Instructional Practices:

Lecture, discussion, and practical application

Suggested Resources:

Primary Resources: Barclay, Leney. Residential Plumbing. Stillwater, Oklahoma: The Mid-America Vocational Curriculum Consortium, Inc. 1985

Blankenbaker, Keith E. Modern Plumbing. South Holland, Illinois: The Goodheart-Willcox Co., Inc. 1987.

Slater, Harry and Smith, Lee. Basic Plumbing. Delmar Publishers, Inc. 1979.

Frankland, Thomas W. The Pipe Fitter's and Pipe Welder's Handbook. Mission Hills, California: Glencoe Publishing Co. (no date).

Evaluation and Suggested Minimum Performance Standards:

*Objective 1: The student will match four terms related to water valves and faucets with their correct definitions.
*Objective 2: The student will identify three types of valves.
*Objective 3: The student will identify two types of faucets.
Objective 4: The student will list 15 features which best describe specific faucets.

*Objective 5: The student will list 15 types of copper tubing fittings (sweat, flare,compression).

*Indicates core/essential objectives

Performance Record: Place a check by each objective that the student achieved:

____*1. Matched terms related to water valves and faucets with their correct definitions.
____*2. Identified three types of valves.
____*3. Identified types of faucets.
____ 4. Listed features which best describe specific faucets.
____*5. Listed types of copper tubing fittings (sweat, flare, compression).

*Indicates core/essential objectives

COURSE: Plumber/Pipefitter/Steamfitter II

Unit 9: Plumbing Fixtures (25 days)

Objectives: Upon completion of this unit, the student will:

*1. Match terms related to fixtures and appliances with their correct definitions.
*2. Identify common fixtures and appliances used in residential plumbing.
*3. Match fixtures and appliances with their correct installation requirements.
4. Demonstrate the ability to install plumbing fixtures.

*Indicates core/essential objectives

Suggested Instructional Practices:

Lecture, discussion, and practical application

Suggested Resources:

Primary Resources: Barclay, Leney. Residential Plumbing. Stillwater, Oklahoma: The Mid-America Vocational Curriculum Consortium, Inc. 1985

Blankenbaker, Keith E. Modern Plumbing. South Holland, Illinois: The Goodheart-Willcox Co., Inc. 1987.

Slater, Harry and Smith, Lee. Basic Plumbing. Delmar Publishers, Inc. 1979.

Frankland, Thomas W. The Pipe Fitter's and Pipe Welder's Handbook. Mission Hills, California: Glencoe Publishing Co. (no date).

Evaluation and Suggested Minimum Performance Standards:

*Objective 1: The student will match 15 terms related to fixtures and appliances with their correct definitions.
*Objective 2: The student will identify seven common fixtures and appliances used in residential plumbing.
*Objective 3: The student will match 25 fixtures and appliances with their correct installation requirements.

Objective 4: The student will install two plumbing fixtures.

*Indicates core/essential objectives

Performance Record: Place a check by each objective that the student achieved:

____*1. Matched terms related to fixtures and appliances with their correct definitions.
____*2. Identified common fixtures and appliances used in residential plumbing.
____*3. Matched fixtures and appliances with their correct installation requirements.
____ 4. Demonstrated the ability to install plumbing fixtures.

*Indicates core/essential objectives

STUDENT PERFORMANCE RECORD

PLUMBER/PIPEFITTER/STEAMFITTER

PLUMBER/PIPEFITTER/STEAMFITTER I

Student: _____

This record is provided as an alternative to the student performance records at the end of each unit. It can be duplicated for each student and serve as a cumulative record of competencies achieved in the course.

Place a check by each objective the student achieved; you may wish to note the date that the student achieved the objective.

C = Core competencies.

____ C1. Identified terms and definitions associated with the fundamentals of plumbing.
____ C2. Identified the duties of a plumber.
____ 3. Listed jobs related to plumbing.
____ 4. Listed reasons plumbers are needed.
____ 5. Named the student organization related to Plumbing/Pipefitting/Steamfitter program.
____ 6. Listed occupational fields related to plumbing.
____ C7. Identified general safety rules related to plumbing.
____ C8. Listed personal safety rules.
____ C9. Listed shop safety rules.
____ C10. Demonstrated the proper technique in lifting heavy objects.
____ C11. Identified terms and definitions associated with tools and equipment.
____ C12. Identified basic hand tools used in plumbing.
____ C13. Listed proper use and care of hand tools.
____ 14. Identified power tools generally used in plumbing.
____ C15. Listed proper use and care of power tools.
____ C16. Listed safety precautions to be applied in the use of power tools used in plumbing.
____ C17. Listed equipment used in plumbing, pipefitting and steamfitting.
____ C18. Used hand tools to cut a length of pipe.
____ C19. Identified rulers used for measuring.
____ C20. Read a rule/tape measure to the nearest eighth of an inch.
____ 21. Measured and marked a predetermined length on a pipe.
____ 22. Used hand tools to ream a piece of steel pipe.
____ 23. Used hand tools to cut pipe threads.
____ 24. Matched terms related to oxyacetylene cutting with their correct definitions.
____ 25. Identified parts of an oxyacetylene cutting torch.
____ 26. Listed rules for tip use.
____ C27. Listed steps for properly starting a cut.

____C28. Listed special safety requirements for oxyacetylene cutting.
____ 29. Set up equipment for oxyacetylene cutting.
____C30. Laid out a pattern on steel plate and cut pattern.
____C31. Set up and cut a pipe level by hand.
____ 32. Cut a hole in mild steel.
____C33. Matched terms related to oxyacetylene welding with their correct definitions.
____C34. Listed equipment required for oxyacetylene welding.
____C35. Listed safety rules for the oxyacetylene work area.
____C36. Listed safe clothing requirements.
____C37. Listed basic safety rules for oxyacetylene cylinders and gases.
____C38. Identified types of oxyacetylene flames.
____C39. Lit, adjusted, and shut off an oxyacetylene welding torch in adherence with safety standards.
____C40. Listed causes of backfire and flashback.
____ 41. Listed welding positions.
____ 42. Laid beads on a flat plate with no filler rod.
____ 43. Laid beads on a flat plate with a filler rod.
____ 44. Welded a butt point in the flat position.
____ 45. Matched terms related to Shielded Metal Arc Welding with their correct definitions.
____ 46. Selected true statements concerning principles of Shielded Metal Arc Welding.
____C47. Listed statements concerning electrical safety for arc welding.
____C48. Listed statements concerning hazards associated with arc rays.
____C49. Listed protective clothing required for arc welding.
____ 50. Listed basic Shielded Metal Arc Welding accessories and their purposes.
____ 51. Listed basic elements of arc welding and their importance.
____C52. Struck an arc and laid a flat bead.
____C53. Welded a butt joint in the flat position.
____ 54. Demonstrated methods of starting an arc.
____C55. Matched terms related to pipe with their correct definitions.
____C56. Listed types of pipes used in plumbing.
____C57. Matched types of copper pipe with the correct identification colors.
____C58. Distinguished the difference between black and galvanized steel pipe.
____C59. Listed advantages and disadvantages of P.V.C. pipe.
____C60. Listed the three common methods of measuring pipe.
____C61. Matched terms related to joining pipe with their correct definitions.

____C62. Listed tools, materials, and equipment necessary to join steel pipe.
____C63. Listed tools, materials, and equipment necessary to join copper tubing by the sweat joint method.
____C64. Selected tools, materials, and equipment necessary to join copper tubing by the compression method.
____C65. Selected tools, materials, and equipment necessary to join copper tubing by the flare method.
____C66. Cut, reamed, threaded, and joined a piece of steel pipe to a steel fitting.
____C67. Cut, reamed, and joined copper tubing using the sweat method.
____C68. Cut, reamed, and joined copper tubing using a compression joint.
____C69. Cut, reamed, and joined copper tubing using a flare joint.
____C70. Threaded steel pipe with adjustable die.
____C71. Identified sizes of steel pipe.
____C72. Cut, reamed, and joined PVC pipe to a PVC fitting.
____C73. Defined a gravity feed system.
____C74. Matched terms related to pipe fittings with their correct definitions.
____C75. Matched the materials used to make plumbing fittings with specific uses, types, and properties.
____C76. Identified basic plumbing branches.
____C77. Identified basic plumbing bends.
____C78. Identified basic union and couplings.
____C79. Identified basic caps and plugs.
____C80. Identified basic bushings and nipples.
____C81. Identified basic closet flanges and clean-outs.
____C82. Identified PVC-DWV fittings.
____C83. Distinguished between the two types of malleable iron fittings.
____C84. Identified two types of adapters.
____C85. Read fitting size of a tee.
____C86. Identified mechanical fittings.
____C87. Repaired a water line with a dresser coupling.
____C88. Repaired a water line using a hose and clamp (temporary).

PLUMBER/PIPEFITTER/STEAMFITTER II

Student: _____

This record is provided as an alternative to the student performance records at the end of each unit. It can be duplicated for each student and serve as a cumulative record of competencies achieved in the course.

Place a check by each objective the student achieved; you may wish to note the date that the student achieved the objective.

C = Core competencies.

____ 1. Identified terms and definitions associated with the fundamentals of plumbing.
____ 2. Identified the duties of a plumber.
____ 3. Listed jobs related to plumbing.
____ 4. Listed reasons plumbers are needed.
____ 5. Named the student organization related to Plumber/Pipefitter/Steamfitter programs.
____ C6. Identified general safety rules related to plumbing.
____ C7. Listed personal safety rules.
____ C8. Listed shop safety rules.
____ C9. Demonstrated the proper method of lifting heavy objects.
____C10. Identified terms and definitions associated with tools and equipment.
____C11. Identified basic hand tools used in plumbing.
____C12. Listed proper use and care of hand tools.
____C13. Identified power tools generally used in plumbing.
____C14. Listed proper use and care of hand tools.
____C15. Listed safety precautions to be applied in the use of power tools used in plumbing.
____ 16. Listed equipment used in plumbing, pipefitting, and steamfitting.
____C17. Used hand tools to cut a length of pipe.
____C18. Identified rulers used for measuring.
____C19. Read a rule/tape measure to the nearest eighth of an inch.
____ 20. Demonstrated ability to use power tools.
____ 21. Selected the proper power tool for a job.
____ 22. Demonstrated the ability to use a plumber's level.
____ 23. Matched terms related to oxyacetylene cutting with their correct definitions.
____C24. Identified parts of an oxyacetylene cutting torch.
____ 25. Listed rules for tip use.
____ 26. Listed steps for properly starting a cut.
____C27. Listed special safety requirements for oxyacetylene cutting.

____C28. Set up equipment for oxyacetylene cutting.
____C29. Laid out a pattern on steel plate and cut pattern.
____C30. Set up and cut a pipe bevel by hand.
____ 31. Cut a hole in mild steel.
____ 32. Make a beveled cut on mild steel plate.
____ 33. Made cuts on mild steel and restarted a cut.
____C34. Matched terms related to oxyacetylene welding with their correct definitions.
____C35. Listed equipment required for oxyacetylene welding.
____C36. Listed safety rules for oxyacetylene cylinders and gases.
____C37. Listed safe clothing requirements.
____C38. Listed basic safety rules for oxyacetylene cylinders and gases.
____C39. Identified types of oxyacetylene flames.
____C40. Listed causes of backfire and flashback.
____C41. Lit, adjusted, and shut off an oxyacetylene welding torch in adherence with safety standards.
____C42. Laid beads on a flat plate with no filler rod.
____C43. Laid beads on a flat plate with a filler rod.
____ 44. Welded a butt joint in the flat position.
____ 45. Sweated a copper fitting to a piece of copper tubing.
____C46. Matched terms related to blueprint reading with the correct definitions.
____C47. Listed types of architectural drawings.
____C48. Identified plumbing and appliance symbols.
____C49. Identified piping symbols for plumbing.
____C50. Identified piping symbols for heating.
____C51. Identified fittings and valve symbols.
____C52. Drew a four sided drawing to scale and specification.
____C53. Listed items that are included in a set of specifications.
____C54. Matched terms related to building and plumbing codes with the correct definitions.
____C55. Identified benefits of zoning laws.
____C56. Identified benefits of building codes.
____C57. Identified benefits of plumbing codes.
____C58. Identified illegal fittings and installations.
____C59. Identified procedures to be followed, dealing with water, sewer, and gas main connections.
____C60. Measured a pipe to the nearest 1/16 inch.
____C61. Added and subtracted fractions and whole numbers.
____C62. Computed pipe offsets using trigonometric constants.
____C63. Converted feet to inches.
____C64. Converted inches to feet.
____C65. Converted fractions to decimals.
____C66. Changed decimal to a usable form.
____C67. Identified parts of a builder's level (transit).
____C68. Determined, the rate of fall between two given points, using the builder's level.

____C69. Matched terms related to water valves and faucets with their correct definitions.
____C70. Identified three types of valves.
____C71. Identified types of faucets.
____ 72. Listed features which best describe specific faucets.
____C73. Listed types of copper tubing fittings (sweat, flare, compression).
____C74. Matched terms related to fixtures and appliances with their correct definitions.
____C75. Identified common fixtures and appliances used in residential plumbing.
____C76. Matched fixtures and appliances with their correct installation requirements.
____ 77. Demonstrated the ability to install plumbing fixtures.